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10/525,058	09/06/2005	Christoph Brabec	21928-017US1	5861

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EXAMINER
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MOWLA, GOLAM

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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07/08/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/525,058	<b>Applicant(s)</b> BRABEC ET AL.	
	<b>Examiner</b> Golam Mowla	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04/22/2008, Amendment.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 20-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 20-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>04/24/2008</u>  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment of 04/22/2008 does not render the application allowable.

### ***Status of Objections and Rejections***

2. All objections from the previous office Action are withdrawn in view of Applicant's amendment.
3. All rejections from the previous office Action are withdrawn in view of Applicant's amendment. New ground of rejection under 35 U.S.C. 102 (b) and 35 U.S.C. 103 (a) are necessitated by the amendments.

### ***Claim Objections***

4. Claim 7 is objected to because of the following informalities: "a first electrode supported the structured surface of the substrate" is recited, although "a first electrode supported **by** the structured surface of the substrate" is intended. It is suggested to insert – by – after supported. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 23 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujimori et al. (US PG PUB 2002/0108649, cited in prior office Action).

Regarding claim 23, Fujimori discloses a photovoltaic cell, comprising:

- a substrate (2, fig. 2, ¶ 0069) having a surface (top surface of the substrate 2);
- a support layer (barrier layer 8; fig. 2) having a surface, the support layer being supported by the substrate (2)
- a first electrode (first electrode 3, fig. 2, ¶ 0069) supported by the support layer (8);
- a second electrode (second electrode 6, fig. 2, ¶ 0069); and
- an organic semiconductor (hole transport layer 5, fig. 2; ¶ 0069, 0104, 0016, 0221, 0223) between the first (3) and second (6) electrodes,
  - wherein the surface of the organic semiconductor (top surface of layer 5) is planar (see fig. 1).

Regarding claim 27, Fujimori further discloses that the support layer (8) has a planar surface (see fig. 1).

### ***Claim Rejections - 35 USC § 103***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1-11, 14-15, 21-23, and 27 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Tiedje et al. (US 4514582).

Regarding claim 1, Fujimori discloses an organic photovoltaic component (photoelectric conversion device comprising organic compound, see abstract) comprising:

- a substrate (2, fig. 2, ¶ 0069),
- a first electrode (first electrode 3, fig. 2, ¶ 0069) supported by the substrate (2),
- an organic semiconductor (hole transport layer 5, fig. 2; ¶ 0069, 0104, 0016, 0221, 0223) layer supported by the first electrode (3) and
- a second electrode (second electrode 6, fig. 2, ¶ 0069) supported by the organic semiconductor layer (5),
  - wherein the semiconductor layer (5) has a planar surface (see layer 5).

However, Fujimori does not explicitly disclose whether the substrate has a surface that is structured.

Tiedje teaches a photovoltaic device (col. 3, lines 41-43) wherein the substrate (2) is structured (see fig. 2; col. 3, lines 41-43). Tiedje utilizes a structured substrate because such use is conventional in the photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths (col. 5, lines 11-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured substrate of Tiedje in the photovoltaic component of Fujimori, because such use is conventional in the solar or

Art Unit: 1795

photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths, as taught by Tiedje.

Regarding claim 2, Fujimori in view Tiedje teaches that the substrate has a surface that is structured. Fujimori further discloses that said substrate (2) is a flexible sheet that is structured (§ 0074).

Regarding claim 3, Fujimori in view of Tiedje further discloses that the substrate (2) below the semiconductor layer (5) is structured.

Regarding claims 4 and 5, Fujimori discloses a method, comprising:

- providing a substrate (2, fig. 2, § 0069) having a surface; and
- supporting a semiconductor layer (hole transport layer 5, fig. 2, § 0069, 0106, 0221, 0223) with the surface of the substrate (2), wherein the semiconductor has a planar surface (see figs. 1 and 2).

However, Fujimori does not explicitly disclose whether the substrate has a structured surface.

Tiedje teaches a method of making a photovoltaic (col. 3, lines 41-43) wherein the substrate (2) is structured (see fig. 2; col. 3, lines 41-43). Tiedje utilizes a structured substrate because such use is conventional in the photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths (col. 5, lines 11-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured the surface of the substrate of Tiedje in the method of Fujimori, because such use is conventional in the art as it allows for an

Art Unit: 1795

increase in the photoconductivity of the semiconductor at long wavelengths, as taught by Tiedje.

Regarding claim 6, Fujimori in view of Tiedje discloses that the substrate has a structured surface (see discussion above for claim 5). Fujimori further discloses that the method further comprises disposing an additional layer (electrode 3; fig. 1 and 2) on the structured surface of the substrate so that the additional layer has a structured surface (*"The first electrode 3 is ...formed into a shape, for example, which has a plurality of comb teeth"*, ¶ 0081) that supports the semiconductor layer (5).

Regarding claim 7, Fujimori discloses a photovoltaic cell, comprising:

- a substrate (2, fig. 2, ¶ 0069) having a surface,
- a first electrode (first electrode 3, fig. 2, ¶ 0069) supported by the substrate (2),
- an organic semiconductor (hole transport layer 5, fig. 2; ¶ 0069, 0104, 0016, 0221, 0223) layer supported by the first electrode (3) and
- a second electrode (second electrode 6, fig. 2, ¶ 0069) supported by the organic semiconductor layer (5),
  - wherein the semiconductor layer (5) has a planar surface (see layer 5; figs. 1 and 2).

However, Fujimori does not explicitly disclose whether the surface of the substrate is structured.

Tiedje teaches a photovoltaic device (col. 3, lines 41-43) wherein the substrate (2) is structured (see fig. 2; col. 3, lines 41-43). Tiedje utilizes a structured substrate

Art Unit: 1795

because such use is conventional in the photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths (col. 5, lines 11-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured substrate of Tiedje in the photovoltaic component of Fujimori, because such use is conventional in the solar or photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths, as taught by Tiedje.

Regarding claim 8, Fujimori in view Tiedje teaches that the substrate has a surface that is structured. Fujimori further discloses that said substrate (2) is a flexible sheet that is structured (§ 0074).

Regarding claim 9, Fujimori further discloses that the first electrode (3) is structured (*"The first electrode 3 is ...formed into a shape, for example, which has a plurality of comb teeth"*, § 0081).

Regarding claim 10, Fujimori further discloses that the first electrode (3) is disposed on the substrate (2, see fig. 2).

Regarding claim 11, Fujimori further discloses that the first electrode (3) is made of ITO. Electrode made of ITO is a cathode (applicant's specification, page 2, § 3).

Regarding claim 14, Fujimori further discloses that the photovoltaic cell further comprises a planarized layer (barrier layer 8, § 0069; see fig. 7 that shows the barrier layer is planarized) between the organic semiconductor (5) and the first electrode (3).

Regarding claim 15, Fujimori further discloses that the first electrode (3) is disposed on the substrate (2) (see fig. 2).

Regarding claim 21, Fujimori further discloses that the first electrode (3) has a structured surface (*"The first electrode 3 is ...formed into a shape, for example, which has a plurality of comb teeth"*, ¶ 0081).

Regarding claim 22, Fujimori further discloses that the first electrode (3) has a structured surface (*"The first electrode 3 is ...formed into a shape, for example, which has a plurality of comb teeth"*, ¶ 0081).

Regarding claim 23, Fujimori discloses a photovoltaic cell, comprising:

- a substrate (2, fig. 2, ¶ 0069) having a surface (top surface of the substrate 2);
- a support layer (barrier layer 8; fig. 2) having a surface, the support layer being supported by the substrate (2)
- a first electrode (first electrode 3, fig. 2, ¶ 0069) supported by the support layer (8);
- a second electrode (second electrode 6, fig. 2, ¶ 0069); and
- an organic semiconductor (hole transport layer 5, fig. 2; ¶ 0069, 0104, 0016, 0221, 0223) between the first (3) and second (6) electrodes,
  - wherein the surface of the organic semiconductor (top surface of layer 5) is planar (see fig. 1).

However, Fujimori does not explicitly disclose whether the substrate has a surface that is structured.

Tiedje teaches a photovoltaic device (col. 3, lines 41-43) wherein the substrate (2) is structured (see fig. 2; col. 3, lines 41-43). Tiedje utilizes a structured substrate

Art Unit: 1795

because such use is conventional in the photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths (col. 5, lines 11-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured substrate of Tiedje in the photovoltaic component of Fujimori, because such use is conventional in the solar or photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths, as taught by Tiedje.

Regarding claim 27, Fujimori further discloses that the support layer (8) has a planar surface (see fig. 1).

9. Claims 12 and 13 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Tiedje as applied to claim 7 above, and further in view of Nakamura (US 6291763, cited in the prior Office Action).

Regarding claim 12, Fujimori in view of Tiedje discloses a photovoltaic cell (photoelectric conversion element, see title) addressing all the limitation of the instant claim 7, as addressed above. Fujimori, however, does not explicitly disclose whether the photovoltaic cell further comprise a planarized layer between the substrate and the first electrode.

Nakamura teaches a photovoltaic cell (photoelectric conversion device, see title) wherein the cell comprises a planarized layer (metal mesh 9, fig 2B) between the substrate (transparent substrate 13, fig. 2B, Col. 29, lines 49-54) and first electrode (transparent conductor layer, 12, fig. 2B, Col. 29, lines 49-54). Nakamura uses the

Art Unit: 1795

additional planarized layer between the substrate (13) and the first electrode (12) because it allows for a decrease in the resistance of the transparent substrate (Col. 6, lines 22-26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the planarized layer of Nakamura between the substrate and electrode in the photovoltaic cell of Fujimori in view of Tiedje, because it allows for a decrease in the resistance of the transparent substrate, as taught by Nakamura.

Regarding claim 13, Fujimori in view of Tiedje and Nakamura discloses that a planarized layer between the substrate and the first electrode. Since the planarized layer is in between the substrate and the first electrode, the electrode is disposed on the planarized surface.

10. Claims 16-17 and 20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Shinohara et al. (US 5891264, as cited in IDS submitted on 05/09/2005).

Regarding claim 16, Fujimori discloses a photovoltaic cell, comprising:

- a substrate (2, fig. 2, ¶ 0069);
- a first electrode (first electrode 3, fig. 2, ¶ 0069) supported by the substrate (2);
- a first layer (barrier layer 8; fig. 2) supported by the first electrode (3);
- a second layer (electron transport layer 4 with dye 5 absorbed therein; fig. 2) supported by the first layer (8) (fig. 2);

Art Unit: 1795

- a second electrode (second electrode 6, fig. 2, ¶ 0069); and
- an organic semiconductor (hole transport layer 5, fig. 2; ¶ 0069, 0104, 0016, 0221, 0223) between the first (3) and second (6) electrodes,
  - wherein the first electrode (3) is structured (*"The first electrode 3 is ...formed into a shape, for example, which has a plurality of comb teeth"*, ¶ 0081), a surface of the second layer (top surface of layer 4) is planar (see fig. 1), and a surface of the organic semiconductor (top surface of layer 5) is planar (see fig. 1).

However, Fujimori is silent as to whether the surface of the first layer (8) is structured.

Shinohara discloses a solar cell wherein a first layer (barrier layer 11; fig. 2) supported by the first electrode (Al film 10) and the surface of the first layer is structured (see fig. 2). Shinohara utilizes a structured barrier layer, i.e., first layer because it absorbs a long wavelength component of light easily (col. 9, lines 14-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured first layer of Shinohara in the photovoltaic cell of Fujimori, because it allows the absorption of long wavelength component of light easily, as taught by Shinohara.

Regarding claim 17, Fujimori further discloses that the substrate (2) is not structured (see fig. 1).

Regarding claim 20, Fujimori further discloses the substrate (2) is flexible (¶ 0074).

Art Unit: 1795

11. Claims 24 and 26 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Shinohara.

Regarding claims 24, Fujimori discloses a photovoltaic cell as discussed above for claim 23 (see discussion for claim 23 under “*Claim Rejections - 35 U.S.C. 102*”).

Fujimori, however, is silent as to whether the surface of the support layer is structured.

Shinohara discloses a solar cell wherein a support layer (barrier layer 11; fig. 2) supported by the first electrode (Al film 10) and the surface of the support layer (11) is structured (see fig. 2). Shinohara utilizes a structured barrier layer, i.e., support layer because it absorbs a long wavelength component of light easily (col. 9, lines 14-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured first layer of Shinohara in the photovoltaic cell of Fujimori, because it allows the absorption of long wavelength component of light easily, as taught by Shinohara.

Regarding claim 26, Fujimori discloses that the surface of the substrate is planar (see fig. 1).

12. Claim 25 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Shinohara as applied to claim 24 above, and further in view of Tiedje.

Fujimori in view of Shinohara discloses a photovoltaic cell wherein the surface of the support layer (8) is structured (see discussion above for claim 24). Fujimori further discloses that the surface of the substrate is planar (see fig. 1 or 2). None of the references explicitly teach that the surface of the substrate is structured.

Tiedje teaches a photovoltaic device (col. 3, lines 41-43) wherein the substrate (2) is structured (see fig. 2; col. 3, lines 41-43). Tiedje utilizes a structured substrate because such use is conventional in the photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths (col. 5, lines 11-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured substrate of Tiedje in the photovoltaic component of Fujimori in view of Shinohara, because such use is conventional in the solar or photovoltaic art as it allows for an increase in the photoconductivity of the semiconductor at long wavelengths, as taught by Tiedje.

13. Claims 24-25 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Tiedje as applied to claim 23 above, and further in view of Shinohara.

Regarding claim 24, Fujimori in view of Tiedje discloses a photovoltaic cell as discussed above for claim 23 (see discussion for claim 23 under “*Claim Rejections - 35 U.S.C. 103*”). Fujimori, however, is silent as to whether the surface of the support layer is structured.

Shinohara discloses a solar cell wherein a support layer (barrier layer 11; fig. 2) supported by the first electrode (Al film 10) and the surface of the support layer (11) is structured (see fig. 2). Shinohara utilizes a structured barrier layer, i.e., support layer because it absorbs a long wavelength component of light easily (col. 9, lines 14-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured first layer of Shinohara in the

Art Unit: 1795

photovoltaic cell of Fujimori, because it allows the absorption of long wavelength component of light easily, as taught by Shinohara.

Regarding claim 25, Fujimori in view of Tiedje discloses that the surface of the substrate is structured (see discussion for claim 23 under “*Claim Rejections - 35 U.S.C. 103*”).

14. Claims 23-24 and 26 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Fujimori in view of Shinohara.

Regarding claims 23-24, Fujimori discloses a photovoltaic cell, comprising:

- a substrate (2, fig. 2, ¶ 0069) having a surface (top surface of the substrate 2);
- a support layer (barrier layer 8; fig. 2) having a surface, the support layer being supported by the substrate (2)
- a first electrode (first electrode 3, fig. 2, ¶ 0069) supported by the support layer (8);
- a second electrode (second electrode 6, fig. 2, ¶ 0069); and
- an organic semiconductor (hole transport layer 5, fig. 2; ¶ 0069, 0104, 0016, 0221, 0223) between the first (3) and second (6) electrodes,
  - wherein the surface of the organic semiconductor (top surface of layer 5) is planar (see fig. 1).

Fujimori, however, is silent as to whether the surface of the support layer is structured.

Shinohara discloses a solar cell wherein a support layer (barrier layer 11; fig. 2) supported by the first electrode (Al film 10) and the surface of the support layer (11) is structured (see fig. 2). Shinohara utilizes a structured barrier layer, i.e., support layer because it absorbs a long wavelength component of light easily (col. 9, lines 14-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the structured first layer of Shinohara in the photovoltaic cell of Fujimori, because it allows the absorption of long wavelength component of light easily, as taught by Shinohara.

Regarding claim 26, Fujimori discloses that the surface of the substrate is planar (see fig. 1).

### ***Response to Arguments***

15. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments are directed towards Fujimori's substrate (2). Applicant argues that the substrate is not structured and the "uneven lines at the lower and side edges of substrate 2 that are shown in Fig. 2 of Fujimori merely indicate that these are partial views." The argument has been considered and the rejections are withdrawn and new grounds of rejections are presented (see above).

***Correspondence/Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-F, 0900-1700 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./  
Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795